installation, start-up and service instructions

LIGHT COMMERCIAL CONDENSING UNITS

538J
Sizes 018-060

Cancels: New

II 538J-18-1
1/15/02

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SAFETY CONSIDERATIONS

Installing and servicing air-conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install or service air-conditioning equipment.

Untrained personnel may perform basic maintenance such as cleaning and replacing filters. All other operations should be performed by trained service personnel. When working on air-conditioning equipment, observe safety precautions in literature, and on tags and labels attached to unit.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for brazing operations. Have a fire extinguisher available. Read these instructions thoroughly. Consult local building codes and National Electrical Code (NEC, U.S.A. Standard) for special installation requirements.

INSTALLATION

⚠ **WARNING:** Before installing or servicing system, always turn off main power to system. There may be more than one disconnect switch. Turn off accessory heater power if applicable. Electrical shock can cause personal injury.

I. COMPLETE PRE-INSTALLATION CHECKS

A. Unpack Unit

Move unit to final location. Remove unit packaging being careful not to damage service valves or grilles.

B. Inspect Shipment

File claim with shipping company if shipment is damaged or incomplete. Check unit nameplate to ensure unit matches job requirements.

C. Consider System Requirements

Consult local building codes and NEC for special installation requirements.

Allow sufficient space for airflow clearance, wiring, refrigerant piping, and servicing unit. See Fig. 1 and 2. Unit can be mounted on a level pad directly on base legs or mounted on raised pads at support points. See Fig. 2 for center of gravity.

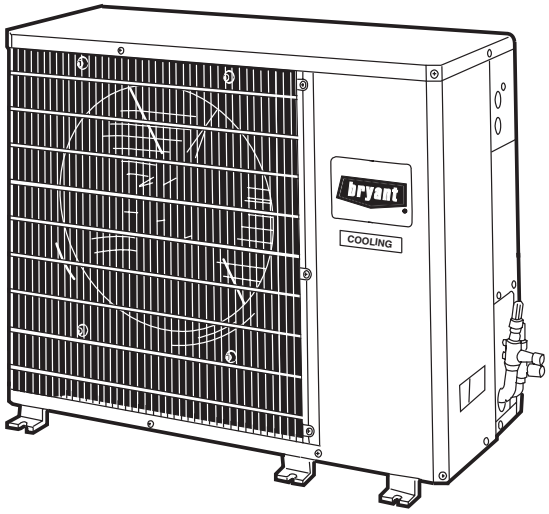
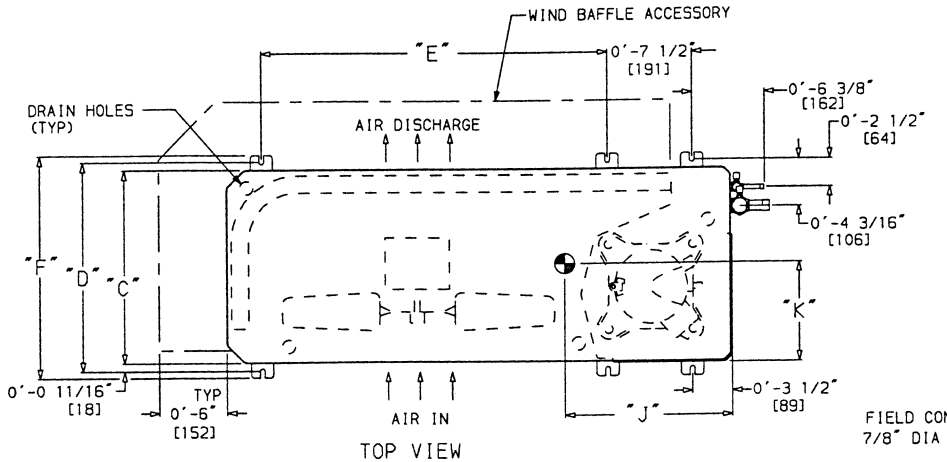


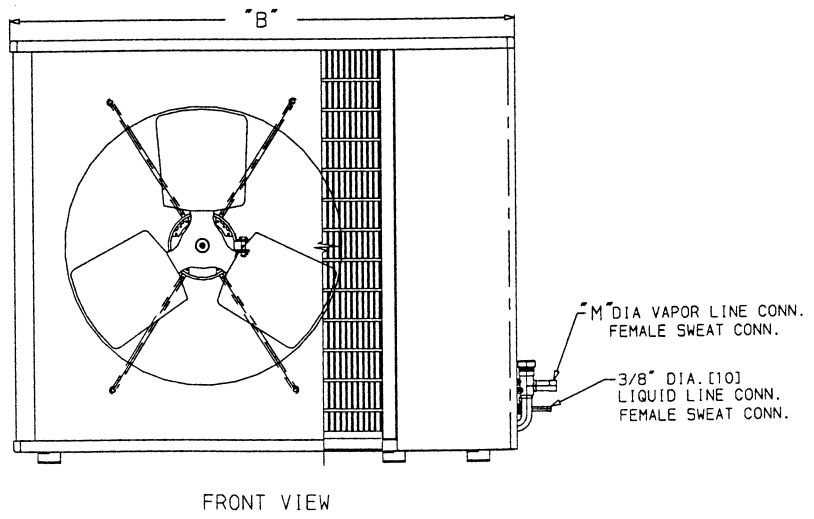
Fig. 1 — Typical Condensing Unit

UNIT SIZE 538J	A		B		C		D		E		F		G		H		J		K		L		M		OPERATING WEIGHT	
	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	lb	kg
018	2-1 1/8	638.2	3-0 15/16	938.2	1-2 9/16	369.9	1-4	406.4	1-11 7/16	595.3	1-5 3/16	436.6	1-5 1/2	444.5	1-8 1/8	511.2	1-1	330.2	0-6 5/8	168.3	0-11 1/4	285.8	0-0 5/8	15.88	130	58.9
024	2-1 1/8	638.2	3-0 15/16	938.2	1-2 9/16	369.9	1-4	406.4	1-11 7/16	595.3	1-5 3/16	436.6	1-5 1/2	444.5	1-8 1/8	511.2	1-1	330.2	0-6 3/4	171.5	0-11 5/8	295.3	0-0 5/8	15.88	136	61.6
030	2-1 1/8	638.2	3-0 15/16	938.2	1-2 9/16	369.9	1-4	406.4	1-11 7/16	595.3	1-5 3/16	436.6	1-5 1/2	444.5	1-8 1/8	511.2	1-1	330.2	0-6 3/4	171.5	0-11 5/8	295.3	0-0 3/4	19.05	161	73.0
036	2-1 1/8	638.2	3-0 15/16	938.2	1-2 9/16	369.9	1-4	406.4	1-11 7/16	595.3	1-5 3/16	436.6	1-5 1/2	444.5	1-8 1/8	511.2	1-1	330.2	0-6 3/4	171.5	0-11 5/8	295.3	0-0 3/4	19.05	185	83.9
048	3-1 3/16	944.6	3-8 9/16	1131.9	1-5 1/16	433.4	1-6 7/16	468.3	2- 6 1/2	774.7	1-7 5/8	498.5	2-5 5/8	752.5	2-8 3/16	817.6	1-1 7/8	352.4	0-8 1/4	209.5	0- 4	406.4	0-0 7/8	22.22	222	100.5
060	3-1 3/16	944.6	3-8 9/16	1131.9	1-5 1/16	433.4	1-6 7/16	468.3	2- 6 1/2	774.7	1-7 5/8	498.5	2-5 5/8	752.5	2-8 3/16	817.6	1-1 11/16	347.7	0-8 1/8	206.4	0- 3 7/8	403.2	0-0 7/8	22.22	249	112.9



UNIT SIZE 538J	MINIMUM MOUNTING PAD DIMENSIONS Support Feet	
	ft-in.	mm
018,024,030 and 036	1-11 x 3-6	584.2 x 1066.8
048 and 060	2- 0 x 4-2	609.6 x 1270.0

NOTES:
1. Required clearances: With coil facing wall, allow 6″ (156.4 mm) minimum clearance on coil side and coil end, and 3 ft (914.4 mm) minimum clearance on compressor end and fan side. With fan facing wall, allow 8″ (203.2 mm) minimum clearance on fan side and coil end, and 3 ft (914.4 mm) minimum clearance on compressor end and coil side. With multi-unit application, arrange units so discharge of one does not enter inlet of another.
2. Dimensions in parenthesis are in millimeters.
3. Center of gravity ⊕ .



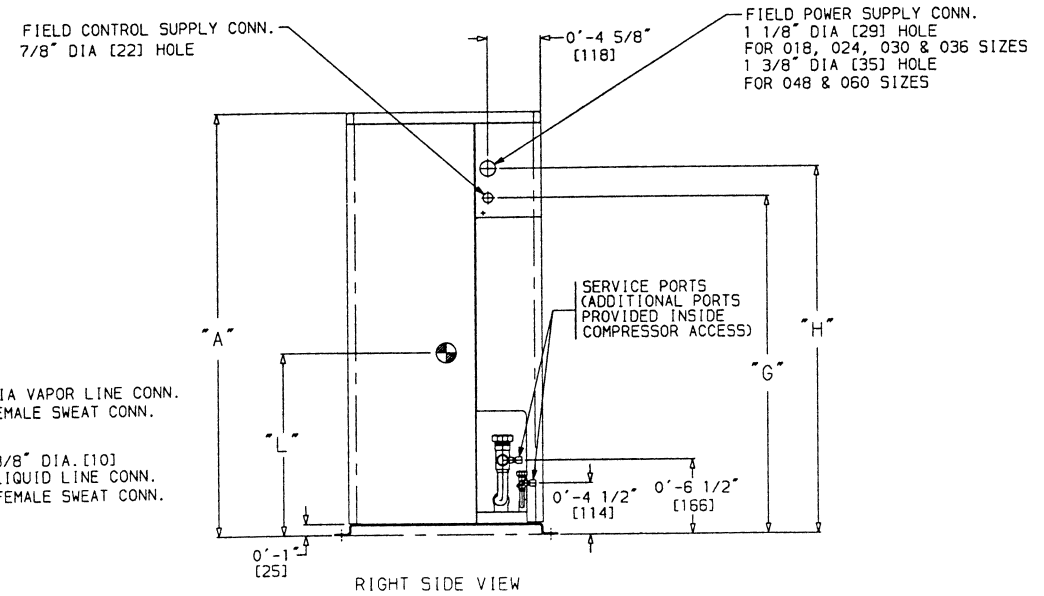

FIELD CONTROL SUPPLY CONN. 7/8" DIA [22] HOLE
0'-4 5/8" [118]
FIELD POWER SUPPLY CONN. 1 1/8" DIA [29] HOLE FOR 018, 024, 030 & 036 SIZES 1 3/8" DIA [35] HOLE FOR 048 & 060 SIZES
SERVICE PORTS (ADDITIONAL PORTS PROVIDED INSIDE COMPRESSOR ACCESS)
"A"
"H"
"G"
"L"
0'-4 1/2" [114]
0'-6 1/2" [166]
0'-1" [25]
RIGHT SIDE VIEW

Fig. 2 — 538J018-060 — Dimensional Drawing

II. RIG AND MOUNT UNIT

A. Mounting on Ground

Mount unit on a solid, level concrete pad. Position unit so water or ice from roof does not fall directly into unit. Field-fabricated stacking kits can be used when units are to be stacked. If conditions or local codes require unit to be fastened to a pad, 6 field-supplied tiedown bolts should be used and fastened through slots provided in unit mounting feet.

B. Mounting on Roof

Mount unit on level platform or frame at least 6 in. above roof surface. Isolate unit and tubing from structure.

C. Rigging

⚠ **CAUTION:** Be sure unit panels are securely in place prior to rigging.

Keep unit upright. Lift unit using sling. Use cardboard or padding under sling, and spreader bars to prevent sling damage to unit. See Fig. 3. See Fig. 2 for center of gravity reference. Install unit so coil does not face into prevailing winds. If this is not possible and constant winds above 25 mph are expected, use field-fabricated wind baffle.

NOTE: Accessory wind baffles should be used on all units with accessory low-ambient control.

Field-fabricated snow stand may be used to raise unit when operation will be required during the winter. Units may also be wall mounted using the accessory wall mounting kit.

III. COMPLETE REFRIGERATION PIPING CONNECTIONS

Outdoor units may be connected to indoor units using field-supplied tubing of refrigerant grade and condition. See Tables 1A and 1B for correct line sizes. Do not use less than 10 ft (3 m) of interconnecting tubing.

⚠ **CAUTION:** DO NOT BURY MORE THAN 36 IN. (922 mm) OF REFRIGERANT PIPE IN THE GROUND. If any section of pipe is buried, there must be a 6 in. (154 m) vertical rise to the valve connections on the outdoor unit. If more than the recommended length is buried, refrigerant may migrate to the cooler, buried section during extended periods of system shutdown. This causes refrigerant slugging and could damage compressor at start-up.

When more than 50 ft (15.2 m) of interconnecting tubing and more than 30 ft (9.1 m) of vertical lift is used, refer to Part 3 of the System Design Manual for design details, or contact your local distributor.

If either refrigerant tubing or indoor coil is exposed to atmospheric conditions for longer than 5 minutes, it must be evacuated to 1000 microns to eliminate contamination and moisture in the system.

Run refrigerant tubes as directly as possible, avoiding unnecessary turns and bends. Suspend refrigerant tubes so they do not damage insulation on vapor tube and do not transmit vibration to the structure. Also, when passing refrigerant tubes through the wall, seal opening so that vibration is not transmitted to structure. Leave some slack in refrigerant tubes between structure and outdoor unit to absorb vibration. Refer to separate indoor unit installation instructions for additional information.

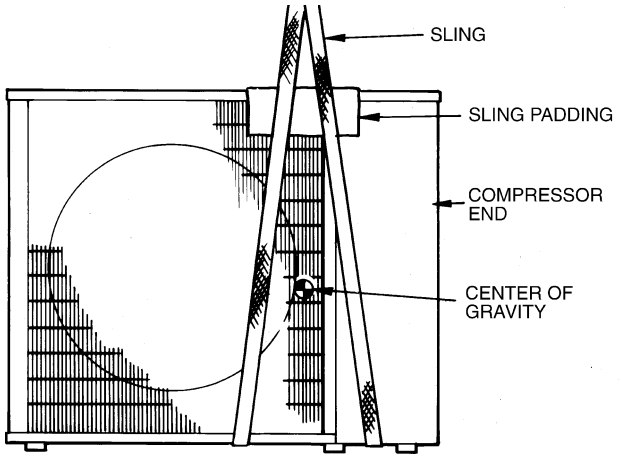


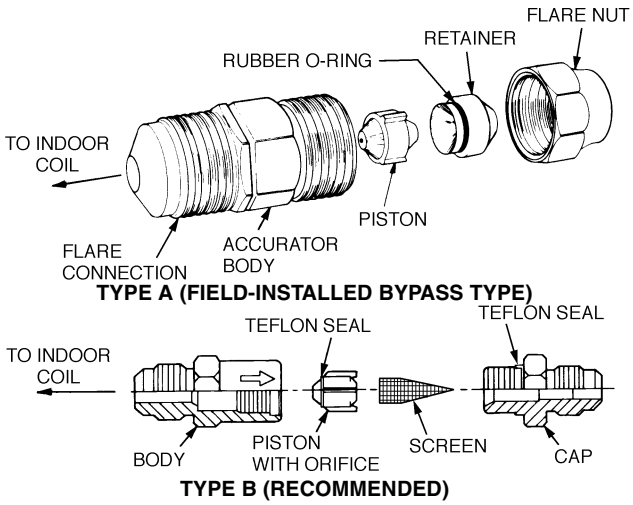
Fig. 3 — Lifting Unit with Sling

A. Check AccuRater® Control

The AccuRater refrigerant control is required for cooling system capacity optimization. An AccuRater device with field-replaceable piston should be supplied with the indoor unit. Refer to AccuRater metering device table in separate indoor unit installation instructions to determine the correct AccuRater piston size required for the condenser/evaporator system being installed.

Note that one of 2 types of the AccuRater devices can be used. Use Type A only if Type B is unavailable. See Fig. 4. Do not interchange components between AccuRater device types. Matching of outdoor unit with indoor unit may require field replacement of piston. Replace piston, if required, before connecting refrigerant lines. Piston replacement instructions are included in the indoor unit installation instructions. After system installation is complete, see Refrigerant Charging section on page 8 to check and/or adjust refrigerant charge.

The 538J series units may also be installed with units using a thermostatic expansion valve (TXV). If a TXV is used, be sure to remove the piston from the indoor coil. See installation instructions shipped with the TXV for proper positioning and adjustment.



NOTE: Arrow on AccuRater body points in free-flow direction, away from the indoor coil.

Fig. 4 — AccuRater Metering Device Components

B. Make Piping Sweat Connections

Remove plastic caps from liquid and suction service valves. Use refrigerant grade tubing. Service valves are closed from the factory and ready for brazing. After wrapping the service valve with a wet cloth, the tubing set can be brazed to the service valve using either silver bearing or non-silver bearing brazing material. Consult local code requirements. Refrigerant tubing and indoor coil are ready for leak testing.

NOTE: Unit is shipped with a full factory charge of R-22 refrigerant as indicated on nameplate.

Pass nitrogen or other inert gas through piping while brazing to prevent formation of copper oxide.

⚠ **CAUTION:** To avoid damage while brazing, service valves should be wrapped in a heat-sinking material such as a wet cloth.

⚠ **CAUTION:** When brazing tubing sets to the service valves, a brazing shield must be used to prevent damage to the painted unit surface.

C. Provide Safety Relief

A fusible plug is located in unit suction line; do not cap this plug. If local code requires additional safety devices, install as directed.

IV. MAKE ELECTRIAL CONNECTIONS

⚠ **WARNING:** Unit cabinet must have an uninterrupted, unbroken electrical ground to minimize the possibility of personal injury if an electrical fault should occur. This ground may consist of electrical wire connected to the unit ground lug in control compartment, or conduit approved for electrical ground when installed in accordance with NEC, ANSI/NFPA (American National Standards Institute/National Fire Protection Association) 70, and local electrical codes. Failure to follow this warning could result in the installer being liable for personal injury to others.

⚠ **CAUTION:** Unit failure as a result of operation on improper line voltage or excessive phase imbalance constitutes abuse and may cause damage to electrical components. Such operation will invalidate any applicable warranty.

A. Power Wiring

Unit is factory-wired for voltage shown on nameplate. Provide adequate, fused disconnect switch within sight of unit, readily accessible but out of reach of children. Provision for locking the switch open (off) is advisable to prevent power from being turned on while unit is being serviced. Disconnect switch, fuses, and field wiring must be in compliance with NEC (U.S.A. Standard) and applicable local codes. Use minimum 60 C wire for field power connection.

Route power wires through opening in the unit side panel and connect in unit control box as shown on unit label diagram and Fig. 5 and 6. Unit must be grounded.

B. Control Circuit Wiring

Control voltage is 24 v. See Fig. 5 and unit label diagram for field-supplied wiring details. Route control wire through opening in the unit side panel to connection in unit control box.

NOTE: For wire runs up to 50 ft (15 m), use no. 18 AWG (American Wire Gage) insulated wire (35 C minimum). For 50 to 75 ft (15 to 23 m), use no. 16 AWG insulated wire. For more than 75 ft (23 m), use no. 14 AWG insulated wire. See Table 2 for conversion to European wire sizes.

NOTE: Operation of unit on improper line voltage constitutes abuse and could affect any applicable warranty. See Table 3. Do not install unit in system where voltage may fluctuate above or below permissible limits.

See Table 3 for recommended fuse sizes. When making electrical connections, provide clearance at unit for refrigerant piping connections.

Use indoor unit transformer as 24-v (40-va minimum) supply for system as shown in Fig. 5 or use accessory transformer.

⚠ **WARNING:** Before performing service or maintenance, be sure the indoor unit main power switch is off and indoor blower has completely stopped. Failure to do so may result in electrical shock or injury from rotating fan blades.

C. Connections to Duct-Free Fan Coil Units

The 538J units are designed for easy match-up to 619C, 619F, 619ENX018 and 619ENX024 duct-free fan coils. These units provide 24-v power for the outdoor unit from the fan coil. Connect the Y and C terminals of the indoor unit to the blue and brown wires of the outdoor unit with 20 gage (minimum) thermostat wire.

V. ACCESSORY INSTALLATION

Install all unit accessories per accessory installation instructions prior to start-up.

Do not use accessory Time Guard® II device when combining a 538J unit with 619E indoor units.

When ambient temperature will fall below 55 F (13 C), accessory low ambient controller (part no. 53DS900060) is required. When accessory low ambient kit is used, unit should also be equipped with accessory winter start kit and field-fabricated wind baffles.

Table 1A — Physical Data (English)

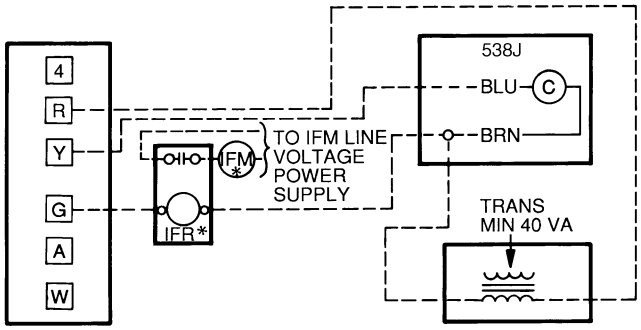
UNIT 538J	018	024	030	036	048	060
NOMINAL CAPACITY (Btuh)	18,000	24,000	30,000	36,000	48,000	60,000
UNIT OPERATING WEIGHT (lb)	130	136	161	185	222	249
COMPRESSOR	Hermetic					
Type	Copeland Scroll	Copeland Scroll	Copeland Scroll	Copeland Scroll	Copeland Scroll	Copeland Scroll
Model	ZR18KC-PFV	ZR24KC-PFV	ZR28KC-PFV	ZR34KC-PFV	ZR47KC-PFV	ZR57KC-PFV
Oil (oz) Initial/Recharge	25/21	25/21	38/34	42/38	42/38	56/52
OUTDOOR FAN	Propeller Type, Direct Drive, Horizontal					
Rpm	850	850	850	850	850	850
Diameter (in.)...No. of Blades	18...3	18...3	18...3	18...3	24...3	24...3
Fan Pitch (Deg)	25	27	27	31	24	24
Motor Hp	1/8	1/8	1/8	1/8	1/4	1/4
Nominal Airflow (Cfm)	1720	1720	1720	1720	3900	3900
OUTDOOR COIL	Copper Tube, Aluminum Plate Fin					
Face Area (sq ft)...No. of Rows	6.1...1	6.1...1.5	6.1...2	6.1...2	12.3...1.5	12.3...1.75
Fins per in.	20	20	20	20	20	20
CONTROLS PRESSURESTAT SETTINGS						
Low Pressure						
Cutout (psig)	7 ± 3					
Cut-In (psig)	22 ± 5					
Fusible Plug	210 F					

NOTE: Line sizes are for runs up to 25 feet.

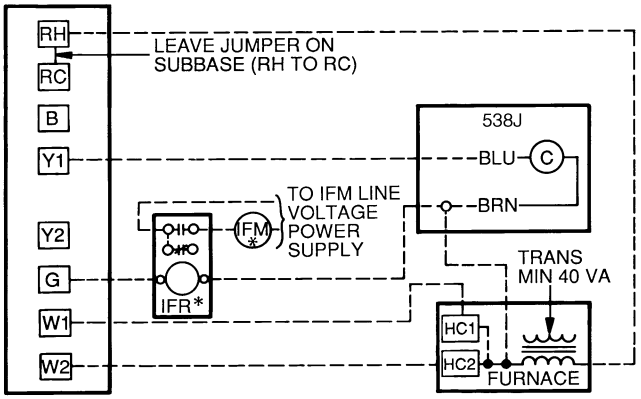
Table 1B — Physical Data (SI)

UNIT 538J	018	024	030	036	048	060
NOMINAL CAPACITY (kW)	5.3	7.0	8.8	10.5	14.1	17.6
UNIT OPERATING WEIGHT (kg)	58.9	61.6	73.0	83.9	100.6	112.9
COMPRESSOR	Hermetic					
Type	Copeland Scroll	Copeland Scroll	Copeland Scroll	Copeland Scroll	Copeland Scroll	Copeland Scroll
Model	ZR18KC-PFV	ZR24KC-PFV	ZR28KC-PFV	ZR34KC-PFV	ZR47KC-PFV	ZR57KC-PFV
Oil (L) Initial/Recharge	.74/.62	.74/.62	1.13/1.00	1.25/1.13	1.25/1.13	1.66/1.54
OUTDOOR FAN	Propeller Type, Direct Drive, Horizontal					
R/s	14.2	14.2	14.2	14.2	14.2	14.2
Diameter (mm)...No. of Blades	457...3	457...3	457...3	457...3	610...3	610...3
Fan Pitch (Deg)	25	27	27	31	24	24
Motor kW	.13	.09	.09	.09	.19	.19
Nominal Airflow (L/s)	812	812	812	812	1840	1840
OUTDOOR COIL	Copper Tube, Aluminum Plate Fin					
Face Area (m^2)...No. of Rows	.57...1	.57...1.5	.57...2	.57...2	1.14...1.5	1.14...1.75
Fins per mm	.8	.8	.8	.8	.8	.8
CONTROLS PRESSURESTAT SETTINGS						
Low Pressure						
Cutout (kPa)	48 ± 21					
Cut-In (kPa)	152 ± 34					
Fusible Plug	99 C					

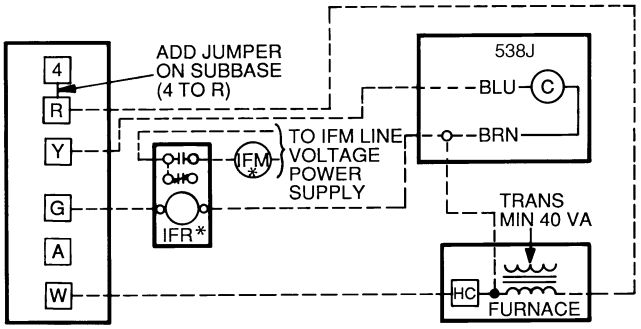
NOTE: Line sizes are for runs up to 7.6 m.



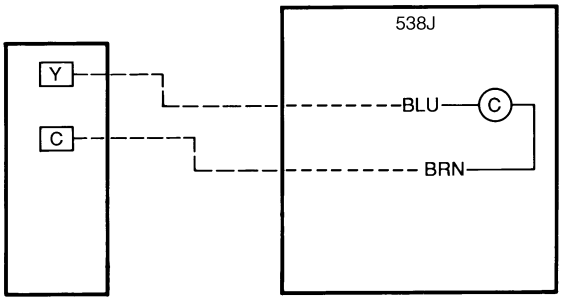
ARRANGEMENT A-(COOLING ONLY)



ARRANGEMENT C-ONE TRANSFORMER
(COOLING AND TWO-STAGE HEATING)



ARRANGEMENT B-ONE TRANSFORMER
(COOLING AND ONE-STAGE HEATING)



ARRANGEMENT 619C, E, F
DUCT-FREE SPLIT INDOOR

LEGEND

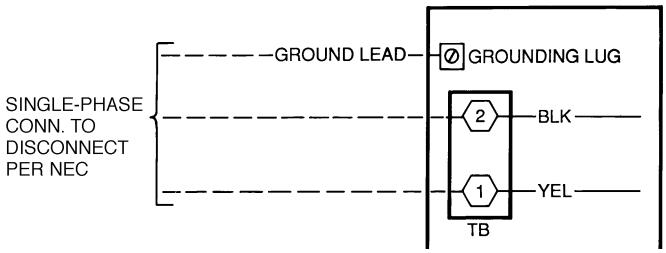
C — Contactor (12-va)
HC — Heating Control
IFM — Indoor-Fan Motor
IFR — Indoor-Fan Relay
TRANS — Transformer
— — — — Field Wiring
——— Factory Wiring

*The IFR and IFM are located in indoor unit on heating-cooling applications. If accessory IFR is required for cooling-only applications, locate (IFR) in fan coil.

NOTES:

1. Refer to unit wiring label for wire colors: BRN to BLU and C to Y connections.
2. Arrangement A, B and C are for use with residential fan coils.

Fig. 5 — Typical Control Circuit Connections



LEGEND

NEC — National Electrical Code (U.S.A. Standard)
TB — Terminal Board
—⬡— — Transformer
— — — — Field Wiring
——— Factory Wiring

Fig. 6 — Line Power Connections

Table 2 — American/European Wire Conversions

AMERICAN		EUROPEAN
Industry Standard Size	American Conversion (mm)	Industry Standard Size (mm^2)
18 AWG	0.82	1.0
16 AWG	1.30	1.5
14 AWG	2.08	2.5
12 AWG	3.30	4.0
10 AWG	5.25	6.0
8 AWG	6.36	10.0
6 AWG	13.29	16.0
4 AWG	21.14	25.0
3 AWG	26.65	—
2 AWG	33.61	35.0
1 AWG	42.39	50.0
1/0 AWG	53.49	—
2/0 AWG	67.42	70.0
3/0 AWG	85.00	95.0
4/0 AWG	107.19	120.0
250 kcmil	126.64	150.0
300 kcmil	151.97	—
350 kcmil	177.90	185.0
400 kcmil	202.63	240.0
500 kcmil	253.29	300.0
600 kcmil	303.95	—

LEGEND

AWG — American Wire Gage
kcmil — Thousand Circular Mils

START-UP

I. PRELIMINARY CHECKS

1. Check that all internal wiring connections are tight and that barriers, covers, and panels are in place.
2. Make certain field electrical power source agrees with unit nameplate rating.
3. Open all service valves.

II. LEAK TEST

Field piping and fan coil must be leak tested by the pressure method. Use R-22 at approximately 25 psig (172 kPa) backed up with an inert gas to a total pressure not to exceed 245 psig (1690 kPa).

III. EVACUATE AND DEHYDRATE

Field piping and fan coil must be evacuated and dehydrated.

IV. CHARGE SYSTEM

Release factory charge into system by opening (backseating) liquid and suction line service valves. Add charge amount as required for the total system. Refer to separate indoor unit installation instructions for the required total system charge when connected to the indoor unit.

V. TO START UNIT

NOTE: When using 538J unit in conjunction with 619 series fan coils, refer to start-up instructions included with fan coil for correct start-up procedures.

Be sure that field disconnect is closed. Set room thermostat below ambient temperature. Operate unit for 15 minutes, then check system refrigerant charge. See Refrigerant Charging section on page 8.

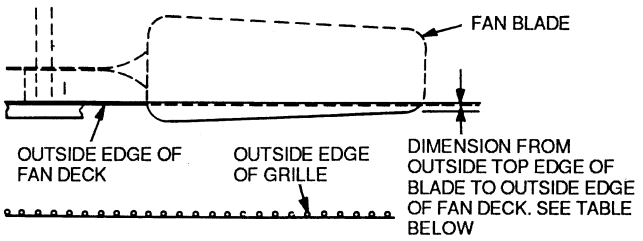
Unit compressor starts after a 5-minute delay if equipped with accessory Time Guard® II device.

SERVICE

⚠ **WARNING:** Before performing recommended maintenance, be sure unit main power switch is off. Failure to do so may result in electrical shock or injury from rotating fan blade.

I. OUTDOOR FAN

A reinforced wire mount holds the outdoor fan assembly in place. See Fig. 7 for proper mounting positions.


FAN BLADE
OUTSIDE EDGE OF FAN DECK
OUTSIDE EDGE OF GRILLE
DIMENSION FROM OUTSIDE TOP EDGE OF BLADE TO OUTSIDE EDGE OF FAN DECK. SEE TABLE BELOW

UNIT 538J DIMENSIONS — in. (mm)		
018	024-036	048-060
0.433 (11)	0.709 (18)	0.16 (4)

Fig. 7 — Condenser Fan Mounting Positions

II. HIGH-PRESSURE RELIEF VALVE

Valve is located in compressor. Relief valve opens at a pressure differential of approximately 450 ± 50 psig (3100 ± 345 kPa) between suction (low side) and discharge (high side) to allow pressure equalization.

III. INTERNAL CURRENT AND TEMPERATURE SENSITIVE OVERLOAD

Control resets automatically when internal compressor motor temperature drops to a safe level (overloads may require up to 45 minutes to reset). When an internal overload is suspected of being open, check by using an ohmmeter or continuity tester.

IV. PUMPDOWN PROCEDURE

The system may be pumped down in order to make repairs on low side without losing complete refrigerant charge.

To pump down:

1. Attach pressure gage to suction service valve gage port.
2. Frontseat the liquid line valve.

⚠ **CAUTION:** The 538J unit coils hold only the factory-designated amount of refrigerant. Additional refrigerant may cause units to relieve pressure through compressor internal pressure relief valve (indicated by sudden rise of suction pressure) before suction pressure reaches 5 psig (34 kPa). If this occurs, shut off unit immediately, then frontseat the suction valve and remove and reclaim excess refrigerant following accepted practice.

3. Start unit and run until suction pressure reaches 5 psig (34 kPa).
4. Shut unit off and frontseat suction valve.
5. Depressurize low side of unit and recover refrigerant following accepted practice.

Table 3 — Electrical Data

538J	V-PH-Hz	OPERATIONAL VOLTAGE*		COMPRESSOR		POWER SUPPLY		
		Min	Max	RLA	LRA	Fan FLA	MCA	Max Fuse† or HACR-Type Ckt Bkr Amps
018	208/230-1-60	187	254	10.7	47.0	.70	14.1	25
024				13.2	59.0	.70	17.2	30
030				15.7	73.0	.70	20.3	35
036				15.7	93.0	.70	20.3	35
048				24.3	131.0	.45	31.8	50
060				28.6	170.0	.45	37.2	65

LEGEND

FLA — Full Load Amps
HACR — Heating, Air Conditioning, Refrigeration
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps per NEC Section 430-24
NEC — National Electrical Code (U.S.A. Standard)
RLA — Rated Load Amps (Compressor)

*Permissible limits of the voltage range at which unit will operate satisfactorily.
†Time-delay fuse.

NOTES:
1. Control circuit is 24 v on all units and requires an external power source.
2. All motors and compressors contain internal overload protection.
3. In compliance with NEC (U.S.A. Standard) requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker.
4. Motor RLA values are established in accordance with UL (Underwriters' Laboratories) Standard 465 (U.S.A. Standard).

c UL US

V. LOW PRESSURE SWITCH

This switch, mounted on the suction line, has fixed non-adjustable settings. To check pressure switch, attach pressure gage to suction service valve gage port. Slowly close liquid shutoff valve and allow compressor to pump down. Do not allow compressor to pump down below 2 psig (14 kPa). Compressor should shut down when suction pressure drops to cutout pressure in Tables 1A and 1B, and should restart when pressure builds up to cut-in pressure shown after accessory CLO (compressor lockout) switch has been reset and accessory Time Guard® II device has completed its timing cycle.

VI. SERVICE VALVES

The service valves in the outdoor unit come from the factory frontseated. This means the refrigerant charge is isolated from the line-set connection ports. To prevent damage to the valve, use a wet cloth or other acceptable heat sink material on the valve before brazing.

The service valves must be backseated (turned counterclockwise until seated) before the service port caps can be removed and the hoses of the gage manifold connected. In this position, refrigerant has access from the through outdoor and indoor unit. The service valve cannot be field repaired; only a complete valve or valve stem seal and service port caps are available for replacement.

VII. ACCURATER® (BYPASS TYPE) DEVICE

See Fig. 4 for bypass type AccuRater device components. The piston has a refrigerant metering hole through it. The retainer forms a stop for the piston in the refrigerant bypass mode and a sealing surface for liquid line flare connection. To check, clean or replace piston:

1. Shut off power to unit.
2. Pump down using Pumpdown Procedure section on page 7.
3. Remove liquid line flare connection from AccuRater device.
4. Pull retainer out of body, being careful not to scratch flare sealing surface. If retainer does not pull out easily, carefully use locking pliers to remove retainer.
5. Slide piston out by inserting a small soft wire, with small kinks, through metering hole. Ensure metering hole, sealing surface around piston cones, and fluted portion of piston are not damaged.
6. Clean piston refrigerant metering hole.
7. Replace retainer O-ring before reassembling AccuRater device (O-ring part no. 99CC501052).

VIII. REFRIGERANT CHARGING

⚠ **WARNING:** To prevent personal injury, wear safety glasses and gloves when handling refrigerant. Do not overcharge system — this can cause compressor flooding.

NOTE: Do not vent or depressurize unit refrigerant to atmosphere. Remove and recover refrigerant following practice.

A. Superheat Method (Cooling, Non-TXV)

To check and adjust charge during cooling season, use Tables 4A-5B and the following procedure:

1. Operate unit a minimum of 15 minutes before checking charge.
2. Measure suction pressure by attaching a gage to suction valve service port.
3. Measure suction line temperature by attaching a service thermometer to unit suction line near suction valve. Insulate thermometer for accurate readings.
4. Measure outdoor coil inlet-air dry bulb temperature with a second thermometer.
5. Measure indoor coil inlet-air wet bulb temperature with a sling psychrometer.
6. Refer to Tables 4A and 4B. Find air temperature entering outdoor coil and wet-bulb temperature entering indoor coil. At this intersection, note the superheat temperature.
7. Refer to Tables 5A and 5B. Find superheat temperature and suction pressure and note suction line temperature.
8. If unit has higher suction line temperature than charted temperature, add refrigerant until charted temperature is reached.
9. If unit has lower suction line temperature than charted temperature, remove and recover refrigerant until charted temperature is reached.

10. If air temperature entering outdoor coil or pressure at suction valve changes, charge to new suction line temperature indicated on chart.

NOTE: The above procedure is independent of indoor air quantity.

B. Subcooling Method (Cooling, TXV)

To check and adjust charge during cooling season, use Tables 6A and 6B and the following procedure:

1. Operate unit a minimum of 15 minutes before checking charge.
2. Measure liquid line temperature near liquid line service valve, and measure liquid pressure at liquid line service valve. Use a digital thermometer for all temperature measurements. DO NOT use mercury or dial-type thermometers.
3. Refer to Tables 6A and 6B. Find temperature point at which the required subcooling temperature intersects the measured liquid line pressure.
4. If the measured liquid line temperature does not agree with the required liquid line temperature, ADD refrigerant to lower the temperature, or REMOVE refrigerant to raise the temperature (allow a tolerance of ± 3 F).

Table 4A — Superheat Charging Table — English (Superheat Entering Suction Service Valve)

OUTDOOR TEMP (F)	INDOOR COIL ENTERING AIR (F) WB													
	50	52	54	56	58	60	62	64	66	68	70	72	74	76
55	9	12	14	17	20	23	26	29	32	35	37	40	42	45
60	7	10	12	15	18	21	24	27	30	33	35	38	40	43
65	*	6	10	13	16	19	21	24	27	30	33	36	38	41
70	*	*	7	10	13	16	19	21	24	27	30	33	36	39
75	*	*	*	6	9	12	15	18	21	24	28	31	34	37
80	*	*	*	*	5	8	12	15	18	21	25	28	31	35
85	*	*	*	*	*	*	8	11	15	19	22	26	30	33
90	*	*	*	*	*	*	5	9	13	16	20	24	27	31
95	*	*	*	*	*	*	*	6	10	14	18	22	25	29
100	*	*	*	*	*	*	*	*	8	12	15	20	23	27
105	*	*	*	*	*	*	*	*	5	9	13	17	22	26
110	*	*	*	*	*	*	*	*	*	6	11	15	20	25
115	*	*	*	*	*	*	*	*	*	*	8	14	18	23

LEGEND

WB — Wet Bulb

*Do not attempt to charge system under these conditions or refrigerant slugging may occur.

Table 4B — Superheat Charging Table — SI (Superheat Entering Suction Service Valve)

OUTDOOR TEMP (C)	INDOOR COIL ENTERING AIR (C) WB													
	10	11	12	13	14	16	17	18	19	20	21	22	23	24
13	5	7	8	9	11	13	14	16	18	19	21	22	23	25
16	4	6	7	8	10	12	13	15	17	18	19	21	22	24
18	*	3	6	7	9	11	12	13	15	17	18	20	21	23
21	*	*	4	6	7	9	11	12	13	15	17	18	20	22
24	*	*	*	3	5	7	8	10	12	13	16	17	19	21
27	*	*	*	*	3	4	7	8	10	12	14	16	17	19
29	*	*	*	*	*	*	4	6	8	11	12	14	17	18
32	*	*	*	*	*	*	3	5	7	9	11	13	15	17
35	*	*	*	*	*	*	*	3	6	8	10	12	14	16
38	*	*	*	*	*	*	*	*	4	7	8	11	13	15
41	*	*	*	*	*	*	*	*	3	5	7	9	12	14
43	*	*	*	*	*	*	*	*	*	3	6	8	11	14
46	*	*	*	*	*	*	*	*	*	*	4	8	10	13

LEGEND

WB — Wet Bulb

*Do not attempt to charge system under these conditions or refrigerant slugging may occur.

Table 5A — Required Suction-Tube Temperature (F) — English (Entering Suction Service Valve)

SUPERHEAT TEMP (F)	SUCTION PRESSURE AT SERVICE PORT (psig)								
	61.5	64.2	67.1	70.0	73.0	76.0	79.2	82.4	85.7
0	35	36	39	41	43	45	47	49	51
2	37	39	41	43	45	47	49	51	53
4	39	41	43	45	47	49	51	53	55
6	41	43	45	47	49	51	53	55	57
8	43	45	47	49	51	53	55	57	59
10	45	47	49	51	53	55	57	59	61
12	47	49	51	53	55	57	59	61	63
14	49	51	53	55	57	59	61	63	65
16	51	53	55	57	59	61	63	65	67
18	53	55	57	59	61	63	65	67	69
20	55	57	59	61	63	65	67	69	71
22	57	59	61	63	65	67	69	71	73
24	59	61	63	65	67	69	71	73	75
26	61	63	65	67	69	71	73	75	77
28	63	65	67	69	71	73	75	77	79
30	65	67	69	71	73	75	77	79	81
32	67	69	71	73	75	77	79	81	83
34	69	71	73	75	77	79	81	83	85
36	71	73	75	77	79	81	83	85	87
38	73	75	77	79	81	83	85	87	89
40	75	77	79	81	83	85	87	89	91

Table 5B — Required Suction-Tube Temperature (C) — SI (Entering Suction Service Valve)

SUPERHEAT TEMP (C)	SUCTION PRESSURE AT SERVICE PORT (kPa)								
	424	443	463	483	503	524	546	568	591
0	2	3	4	5	6	7	8	9	11
1	3	4	5	6	7	8	9	11	12
2	4	5	6	7	8	9	11	12	13
3	5	6	7	8	9	11	12	13	14
4	6	7	8	9	11	12	13	14	15
6	7	8	9	11	12	13	14	15	16
7	8	9	11	12	13	14	15	16	17
8	9	11	12	13	14	15	16	17	18
9	11	12	13	14	15	16	17	18	19
10	12	13	14	15	16	17	18	19	21
11	13	14	15	16	17	18	19	21	22
12	14	15	16	17	18	19	21	22	23
13	15	16	17	18	19	21	22	23	24
14	16	17	18	19	21	22	23	24	25
16	17	18	19	21	22	23	24	25	26
17	18	19	21	22	23	24	25	26	27
18	19	21	22	23	24	26	26	27	28
19	21	22	23	24	25	26	27	28	29
20	22	23	24	25	26	27	28	29	31
21	23	24	25	26	27	28	29	31	32
22	24	25	26	27	28	29	31	32	33

MAINTENANCE

⚠ **WARNING:** Before performing recommended maintenance, be sure unit main power is off. Failure to do so may result in electrical shock or injury from rotating fan blades.

I. LUBRICATION

The outdoor fan motor is factory lubricated and requires no oil.

II. COMPRESSOR

The compressor contains factory oil charges; replace oil when lost. See Tables 1A and 1B for oil recharge. Recommended oil is Sontex 200LT for all units.

III. CLEANING COILS

Coil should be washed out with water or blown out with compressed air. Note that the blow-thru design causes dirt and debris to build up on the inside of the coils.

Clean coil annually or as required by location and outdoor air conditions. Inspect coil monthly and clean as required. Fins are NOT continuous through coil sections. Dirt and debris may pass through the first section, become trapped between the rows of fins, and restrict condenser airflow. Use a flashlight to determine if dirt or debris has collected between coil sections. Clean coil as follows:

1. Turn off unit power.
2. Use a garden hose or other suitable equipment to flush coil from the outside to remove dirt. Be sure to flush all dirt and debris from drain holes in the base of unit. Fan motors are waterproof.

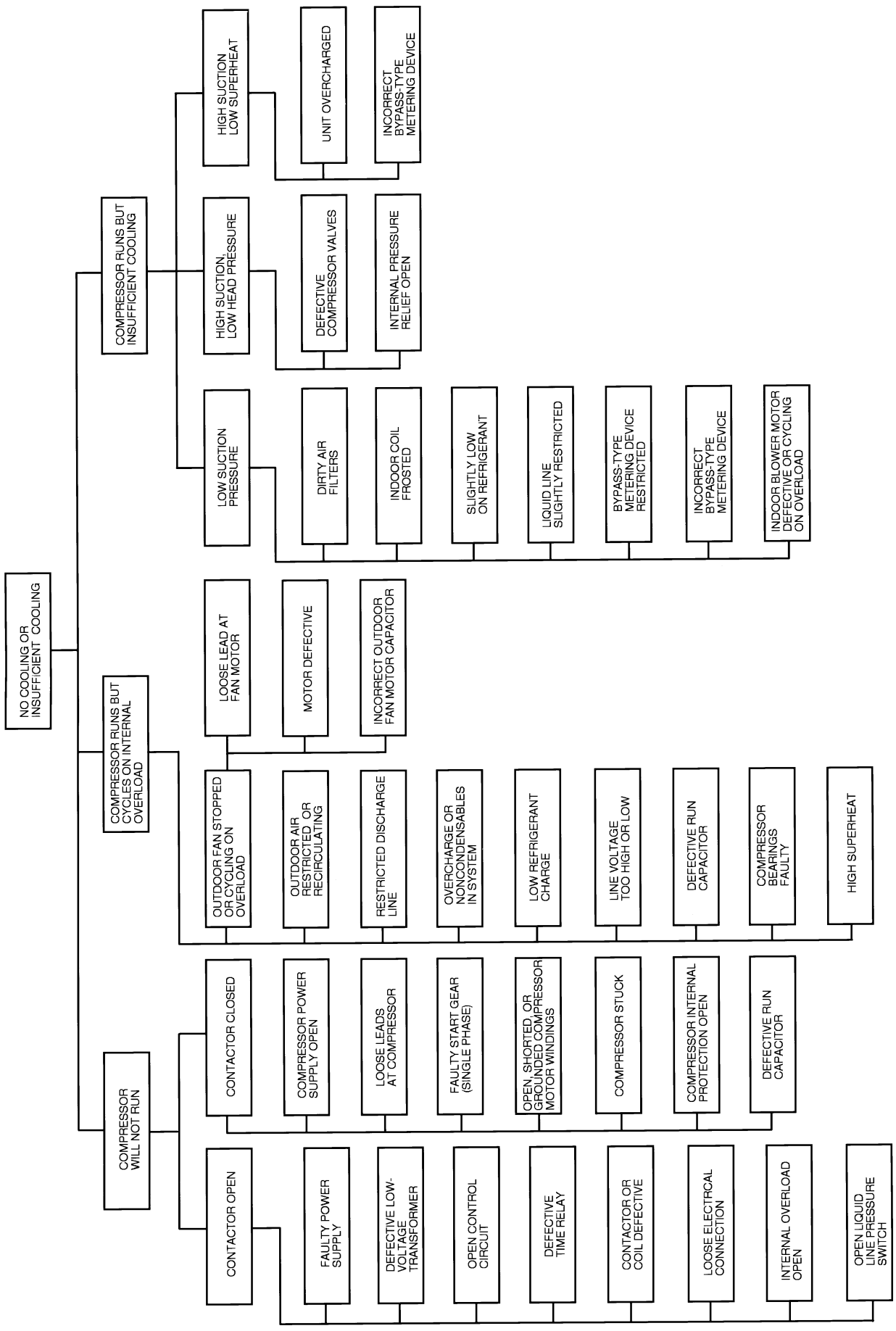
Table 6A — Required Liquid Line Temperature (F) — English (At Service Valve)

REQUIRED SUBCOOLING (F)	LIQUID PRESSURE AT SERVICE VALVE (PSIG)																								
	134	141	148	156	163	171	179	187	196	205	214	223	233	243	253	264	274	285	297	309	321	331	346	359
0	76	79	82	85	88	91	94	97	100	103	106	109	112	115	118	121	124	127	130	133	136	139	142	145
5	71	74	77	80	83	86	89	92	95	98	101	104	107	110	113	116	119	122	125	128	131	134	137	140
10	66	69	72	75	78	81	84	87	90	93	96	99	102	105	108	111	117	120	123	126	129	129	132	135
15	61	64	67	70	73	76	79	82	85	88	91	94	97	100	103	106	109	112	115	118	121	124	127	130
20	56	59	62	65	68	71	74	77	80	83	86	89	92	95	98	101	104	107	110	113	116	119	122	125
25	51	54	57	60	63	66	69	72	75	78	81	84	87	90	93	96	99	102	105	108	111	114	117	120

Table 6B — Required Liquid Line Temperature (C) — SI (At Service Valve)

REQUIRED SUBCOOLING (C)	LIQUID PRESSURE AT SERVICE VALVE (PSIG)																							
	911	969	1030	1061	1121	1186	1219	1286	1360	1397	1471	1547	1588	1671	1755	1800	1885	1976	2026	2125	2222	2264	2379	2475
0	24	26	28	29	31	33	34	36	38	39	41	43	44	46	48	49	51	53	54	56	58	59	61	63
2	22	24	26	27	29	31	32	34	36	37	39	41	42	44	46	47	49	51	52	54	56	57	59	61
4	20	22	24	25	27	29	30	32	34	35	37	39	40	42	44	45	47	49	50	52	54	55	57	59
6	18	20	22	23	25	27	28	30	32	33	35	37	38	40	42	43	45	47	48	50	52	53	55	57
8	16	18	20	21	23	25	26	28	30	31	33	35	36	38	40	41	43	45	46	48	50	51	53	55
10	14	16	18	19	21	23	24	26	28	29	31	33	34	36	38	39	41	43	44	46	48	49	51	53
12	12	14	16	17	19	21	22	24	26	27	29	31	32	34	36	37	39	41	42	44	46	47	49	51
14	10	12	14	15	17	19	20	22	24	25	27	29	30	32	34	35	37	39	40	42	44	45	47	49

TROUBLESHOOTING CHART — COOLING CYCLE



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